

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ00/00127

| A. CLASSIFICATION OF SUBJECT MATTER | | |
|---|---|-----------------------|
| Int. Cl. ⁷ : B05D 5/06, B05C 19/04 | | |
| According to International Patent Classification (IPC) or to both national classification and IPC | | |
| B. FIELDS SEARCHED | | |
| Minimum documentation searched (classification system followed by classification symbols) IPC B05C, B05D, C23C | | |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: B05D 19/04, C23C 10/28, 10/30 | | |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI: See extra sheet for search terms | | |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT | | |
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| A | US 5897738 A (RAJAN et al) 27 April 1999 See whole document | 1-12, 26, 28 |
| A | Derwent abstract Accession No. 95-012049/02 Class A82 G02 (A17) JP 06299099 A (SUMITOMO SEIKA CHEM CO LTD) 25 October 1994 Abstract | 1-12, 26, 28 |
| A | US 5639514 A (JONES et al) 17 June 1997 See whole document | 13-25, 27, 29 |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex | | |
| <p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p> | | |
| Date of the actual completion of the international search <u>26 October 2000</u> | Date of mailing of the international search report <u>- 7 NOV 2000</u> | |
| Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929 | Authorized officer DEREK BUTLER Telephone No : (02) 6283 2347 | |

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ00/00127

| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|---|--|-----------------------|
| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| A | US 5192027 A (DELMER et al) 9 March 1993 See whole document | 13-25, 27, 29 |

INTERNATIONAL SEARCH REPORTInternational application No.
PCT/NZ00/00127**Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos :
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos :
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos :
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See extra sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NZ00/00127

Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1-12, 26 and 28 are directed to a method of applying photo-luminescent pigment to a substrate by preparing a dry powder formulation having at least a photo-luminescent pigment and a carrier/fixer, depositing the formulation onto a substrate and heating the formulation to fuse it to the substrate. It is considered that combination of steps comprises a first "special technical feature".
2. Claims 13-25, 27 and 29 are directed to an apparatus suitable for applying photo-luminescent pigment to a substrate having a hopper to contain a dry powder formulation, an orifice or orifices to transfer the formulation to the substrate surface and a guide system to locate the substrate below the hopper. It is considered that hopper and guide system comprises a second "special technical feature".

These groups are not so linked as to form a single general inventive concept, that is, they do not have any common inventive features, which define a contribution over the prior art. The common concept linking together these groups of claims is depositing photo-luminescent pigment onto a substrate. However this concept is not novel in the light of US 5897738. Therefore these claims lack unity a posteriori.

B. FIELDS SEARCHED

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI: Search terms: luminescent, phosphorescent, fluorescent, powder, particle, dust, pulverised, particulate, particle, coat, cover, layer, heat, fuse, bake, oven, kiln, hot melt, molten, substrate, aluminium, metal, stair, walkway, floor, rail, strip, hopper, bin, chute, feed, supply, guide, locate, move, transfer, pass, B05C, B05D, C23C

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/NZ00/00127

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent Document Cited in Search Report | | | | Patent Family Member | | | |
|--|----------|-----|----------|----------------------|---------|----|---------|
| US | 5897738 | AU | 64955/96 | CA | 2230853 | EP | 847335 |
| | | WO | 9707982 | | | | |
| JP | 06299099 | NIL | | | | | |
| US | 5192027 | AU | 32918/93 | FR | 2691669 | | |
| US | 5639514 | AU | 45104/93 | BR | 9306701 | EP | 648150 |
| | | NZ | 253770 | SG | 46234 | WO | 9401224 |
| END OF ANNEX | | | | | | | |

FREIGHT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

| | |
|---|--|
| Date of mailing (day/month/year) 30 March 2001 (30.03.01) | ETATS-UNIS D'AMERIQUE in its capacity as elected Office |
| International application No. PCT/NZ00/00127 | Applicant's or agent's file reference MF801968/142 |
| International filing date (day/month/year) 17 July 2000 (17.07.00) | Priority date (day/month/year) 16 July 1999 (16.07.99) |
| Applicant DIMOND, George, Trevor et al | |

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

15 February 2001 (15.02.01)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

| | |
|---|---|
| <p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p> | <p>Authorized officer</p> <p>Claudio Borton</p> <p>Telephone No.: (41-22) 338.83.38</p> |
|---|---|

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

Date of mailing (day/month/year)
01 March 2001 (01.03.01)

From the INTERNATIONAL BUREAU

To:

HAWKINS, Michael, Howard
Baldwin Shelston Waters
NCR Building
342 Lambton Quay
Wellington
NOUVELLE-ZÉLANDE

Applicant's or agent's file reference
MF801968/142

IMPORTANT NOTIFICATION

International application No.
PCT/NZ00/00127

International filing date (day/month/year)
17 July 2000 (17.07.00)

1. The following indications appeared on record concerning:

the applicant the inventor the agent the common representative

Name and Address
STRATEGIC INDUSTRIES LIMITED
66 Mandeville Street
Christchurch
New Zealand

State of Nationality

NZ

State of Residence

NZ

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

the person the name the address the nationality the residence

Name and Address
ECOGLO LIMITED
66 Mandeville Street
Christchurch
New Zealand

State of Nationality

NZ

State of Residence

NZ

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

the receiving Office

the designated Offices concerned

the International Searching Authority

the elected Offices concerned

the International Preliminary Examining Authority

other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

C. Cupello

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 12 OCT 2001

WIPO

PCT

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| | | |
|---|--|--|
| Applicant's or agent's file reference MF801968/142 | FOR FURTHER ACTION | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416). |
| International Application No. PCT/NZ00/00127 | International Filing Date (<i>day/month/year</i>) 17 July 2000 | Priority Date (<i>day/month/year</i>) 16 July 1999 |
| International Patent Classification (IPC) or national classification and IPC Int. Cl. 7 B05D 5/06, B05C 19/04 | | |
| Applicant [STRATEGIC INDUSTRIES LIMITED et al] | <i>Ecoglo Limited</i> | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 9 sheet(s).

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

| | |
|---|---|
| Date of submission of the demand 15 February 2001 | Date of completion of the report 3 October 2001 |
| Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929 | Authorized Officer DEREK BUTLER Telephone No. (02) 6283 2347 |

I. Basis of the report

1. With regard to the elements of the international application:*

the international application as originally filed.

the description, pages 1-3, 5-13, as originally filed,
pages 14, 15, filed with the demand,
pages 4, received on 28 May 2001 with the letter of 28 May 2001

the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages 16, 17, filed with the demand,
pages 18-21, received on 28 May 2001 with the letter of 28 May 2001

the drawings, pages 1-3, as originally filed,
pages , filed with the demand,
pages , received on with the letter of

the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

the language of publication of the international application (under Rule 48.3(b)).

the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. The amendments have resulted in the cancellation of:

the description, pages

the claims, Nos.

the drawings, sheets/fig.

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|-----|
| Novelty (N) | Claims 1-32 | YES |
| | Claims - | NO |
| Inventive step (IS) | Claims 1-32 | YES |
| | Claims - | NO |
| Industrial applicability (IA) | Claims 1-32 | YES |
| | Claims - | NO |

2. Citations and explanations (Rule 70.7)

The following documents identified in the International Search Report have been considered for the purposes of this report:

D1 US 5897738
D2 JP 06299099
D3 US 5639514
D4 US 5192027

NOVELTY (N) and INVENTIVE STEP (IS) claims 1-32

Claims 1-12 and 25 define a method of applying photo-luminescent pigment to a substrate including steps of preparing a dry powder formulation having at least a photo-luminescent pigment and a carrier/fixer, depositing the formulation onto a substrate and heating the formulation to fuse it to the substrate. Claims 27, 29 and 31 define products made by the method. Claims 13-24 and 26 define an apparatus suitable for applying photo-luminescent pigment to a substrate, including a hopper to contain a dry powder formulation, an orifice or orifices to transfer the formulation to the substrate surface and a heat-curing system to fuse the powder formulation. Claims 28, 30 and 32 define products made by the apparatus.

None of the prior art, either singly or in combination, discloses or suggests applying photo-luminescent pigment to a substrate by the method as defined or an apparatus suitable for applying photo-luminescent pigment to a substrate as defined.

Closest prior art JP 06299099 discloses fluorescent pigment in polyolefin resin for powder coating fences and signals but does not include the specific steps as defined and US 5192027 discloses an apparatus depositing copper powder onto plastic tubing conveyed under the hopper but does not include a heat-curing system to fuse the powder formulation as defined.

Consequently the subject matter of claims 1-32 is new and not obvious and meets the requirements of Articles 33(2) and (3) of the PCT with regard to novelty and inventive step.

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 25 and 26 do not comply with Rule 6.2(a) because they rely in respect of the technical features of the invention on references to the description or drawings.

At regular intervals as required the hopper is tapped to remove "rat-holes" in the powder and the hopper is refilled with thoroughly mixed dry powder formulation.

- 5 When the production run has finished the representative piece of substrate can be reused as a plug for the hopper's bottom orifice and finally any left-over powder can be removed from the hopper.

It can readily be seen that whereas the above description describes the method of operation for a non-mechanised form of the apparatus the process can readily be automated using the optional automating equipment described above so that the process becomes either semi-automatic or fully automatic. Such automation would be well within the capabilities of the nominally skilled person.

- 15 Where in the foregoing description reference has been made to integers or elements having known equivalents, then such equivalents are herein included as if individually set forth.

Particular examples of the invention have been described and it is envisaged that improvements and modifications can take place without departing from the scope of the appended claims.

*Replaced by
Attache, 2/2*

CLAIMS

1. A method of applying photo-luminescent pigment to a substrate, said method including:
 - 5 preparing a dry powder formulation comprising, at least, a photo-luminescent pigment and a carrier/fixer;
 - depositing the dry powder formulation onto a substrate surface; and,
 - heating the dry powder formulation to fuse it to the substrate surface.
- 10 2. A method as claimed in any preceding claim wherein the substrate surface has depressions or channels adapted to receive the dry powder formulation.
- 15 3. A method as claimed in claim 2 which further includes applying a light reflecting layer to the substrate surface before depositing the dry powder formulation.
- 20 4. A method as claimed in any one of claims 1 to 3 wherein the volume ratio of photo-luminescent pigment to carrier/fixer in the dry powder formulation is such that the fused material exhibits substantially the same strength and durability properties of the carrier/fixer while still exhibiting the photo-luminescent properties of the pigment.
5. A method as claimed in claim 4 wherein the volume ratio is substantially in the range of 1% to 35% photo-luminescent pigment to carrier/fixer.

- 16 -

6. A method as claimed in any preceding claim wherein the dry powered formulation is heated to a temperature recommended by the manufacturer of the carrier/fixer until the formulation is molten.

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7. A method as claimed in claim 6 wherein the formulation is heated to substantially between 160 to 210 degrees centigrade.

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8. A method as claimed in claim 6 or claim 7 wherein the formulation is heated for approximately 10 to 20 minutes.

9. A method as claimed in any preceding claim wherein after heating the formulation is cooled.

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10. A method as claimed in any preceding claim wherein the carrier/fixer is a heat curable polymer.

20

11. A method as claimed in any preceding claim wherein the dry powder formulation includes small quantities of additives, such as a de-gassing additive, to ensure a smooth surface finish.

12. A method as claimed in any preceding claim wherein the substrate is stamped, extruded or milled aluminium or metal.

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13. An apparatus for applying photo-luminescent pigment to a substrate, said apparatus including:
 - a hopper adapted to contain a dry powder formulation;
 - one or more orifices adapted to allow transfer of the dry powder formulation from the hopper to a substrate surface; and
 - 5 a guide rail system for locating the substrate surface in both a fixed horizontal plane and a fixed vertical plane below the hopper and orifice.
14. An apparatus as claimed in claim 13 which also includes a heat-curing system
10 for providing enough heat to turn the dry powder formulation into a molten mix.
15. An apparatus as claimed in claim 13 or 14 which also includes a cooling system to cool the molten mix.
15
16. An apparatus as claimed in any one of claims 13 to 15 which also includes a drive system to move the substrate through the apparatus.
17. An apparatus as claimed in any one of claims 13 to 16 which includes a support roller mounted directly beneath the orifice(s) and hopper to support
20 the substrate.

- 18 -

18. An apparatus as claimed in any one of claims 13 to 17 which includes an adjustable mounting bracket adapted to enable the hopper to be located in the correct position so that the orifice(s) lines up with the substrate.

5 19. An apparatus as claimed in any one of claims 13 to 18 wherein the orifice is adapted to communicate snugly with the substrate surface such that the dry powder formulation is deposited substantially only where required.

10 20. An apparatus as claimed in any one of claims 13 to 19 which includes a mechanism for tapping the hopper so that any rat-holes in the dry powder formulation are re-filled.

15 21. An apparatus as claimed in any one of claims 13 to 20 which includes a brush mounted below the roller, and with its bristles in contact with the roller, so that any powder that falls onto the roller is subsequently brushed off.

22. An apparatus as claimed in any one of claims 13 to 21 wherein the heat-curing system is an oven.

20 23. An apparatus as claimed in any one of claims 13 to 21 wherein the heat-curing system is a continuous oven process.

24. An apparatus as claimed in claim 23 wherein the oven includes infra-red heating elements.

- 19 -

25. An apparatus as claimed in any one of claims 13 to 24 which includes an automatic loading and unloading means at each end.
- 5 26. A method of applying photo-luminescent pigment to a substrate as herein described with reference to the examples.
27. An apparatus for applying photo-luminescent pigment to a substrate as herein described with reference to the accompanying drawings.
- 10 28. A substrate bearing photo luminescent material when prepared using a method according to any one of claims 1 to 12 and 26.
29. A substrate bearing photo luminescent material when prepared using an apparatus according to any one of claims 13 to 25 and 27.

- 4 -

the carrier/fixer, for approximately 10 to 20 minutes or until the formulation is molten. The molten formulation may be cooled after heating.

Preferably the carrier/fixer is a heat curable polymer.

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Preferably the dry powder formulation may include small quantities of additives, such as a de-gassing additive, to ensure a smooth surface finish.

Preferably the substrate is stamped, extruded or milled aluminium or metal.

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According to a second aspect of the invention there is provided an apparatus for applying photo-luminescent pigment to a substrate, said apparatus including:

15

a hopper adapted to contain a dry powder formulation;
one or more orifices adapted to allow transfer of the dry powder formulation from the hopper to a substrate surface; and
a guide rail system for locating the substrate surface in both a fixed horizontal plane and a fixed vertical plane below the hopper and orifice.

20

Preferably the apparatus also includes a heat-curing system for providing enough heat to turn the dry powder formulation into a molten mix.

Preferably the apparatus also includes a cooling system to cool the molten mix.



(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

1/3

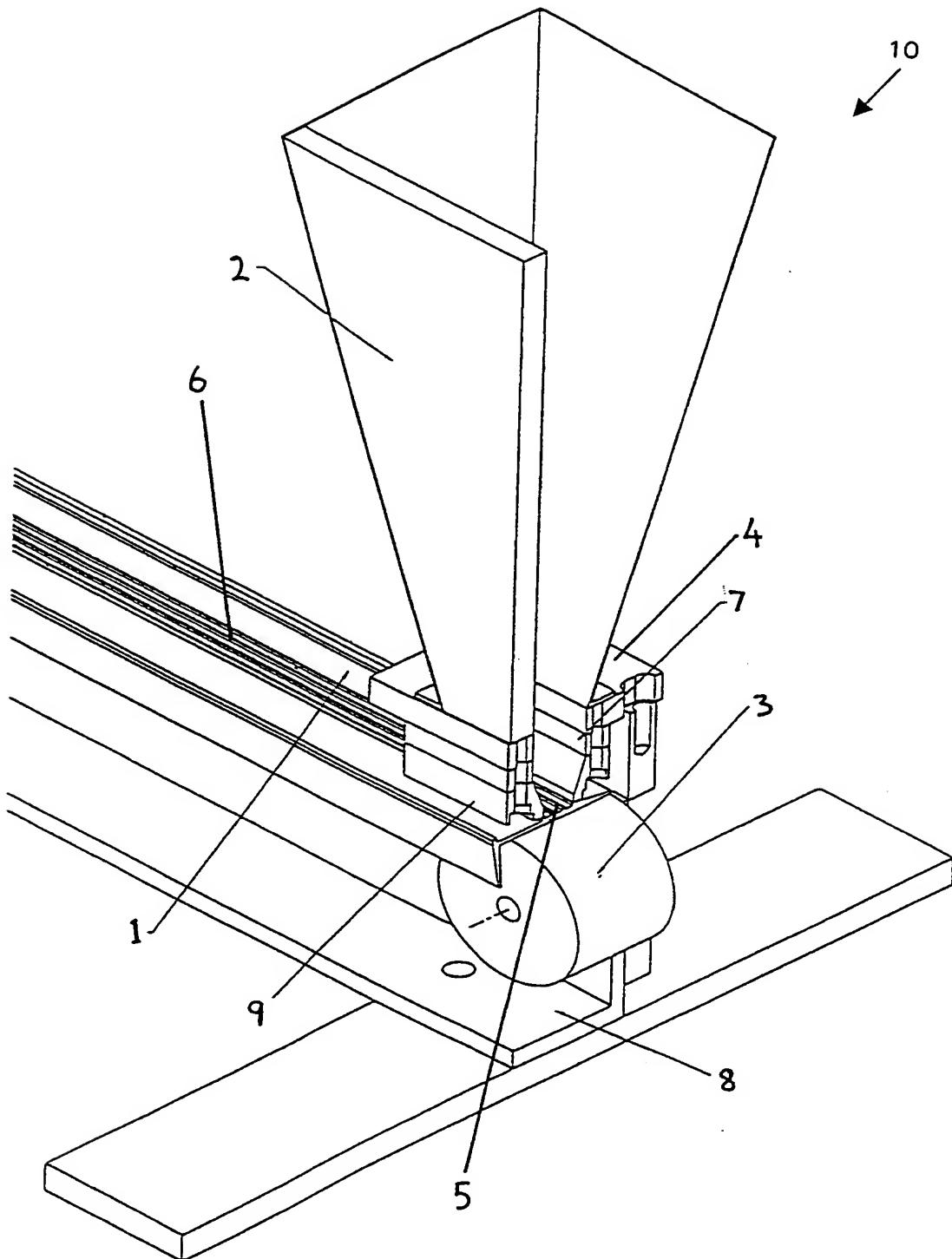


FIGURE 1

2/3

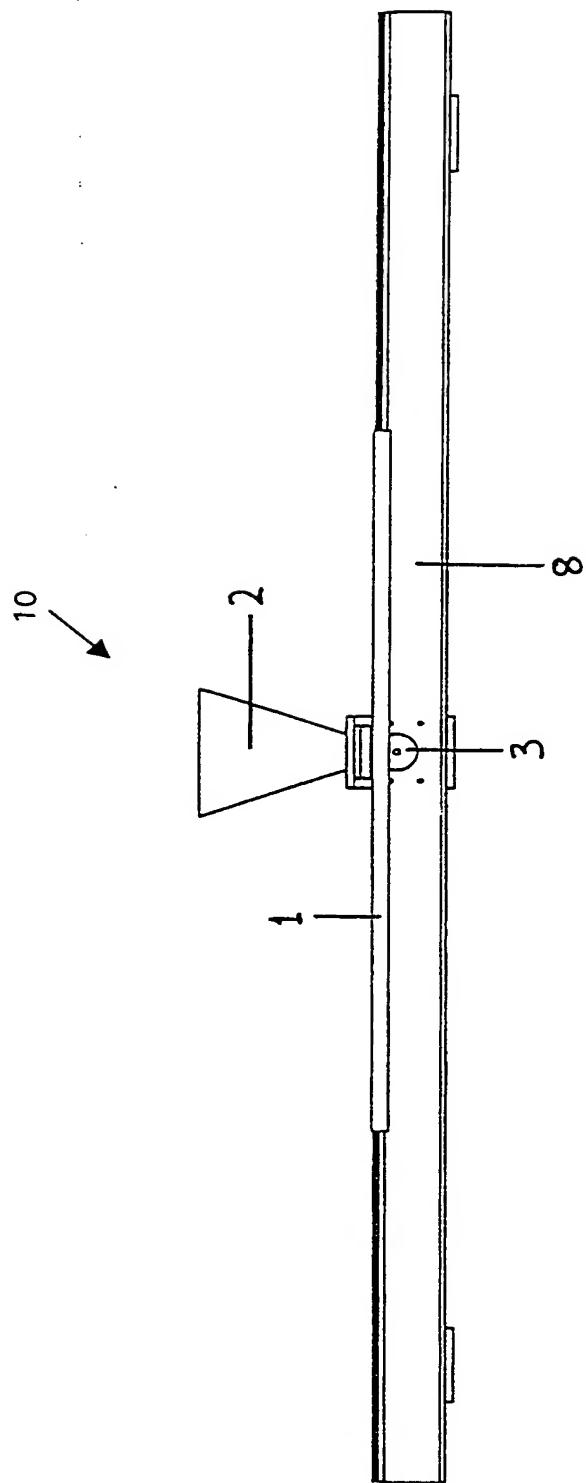


FIGURE 2

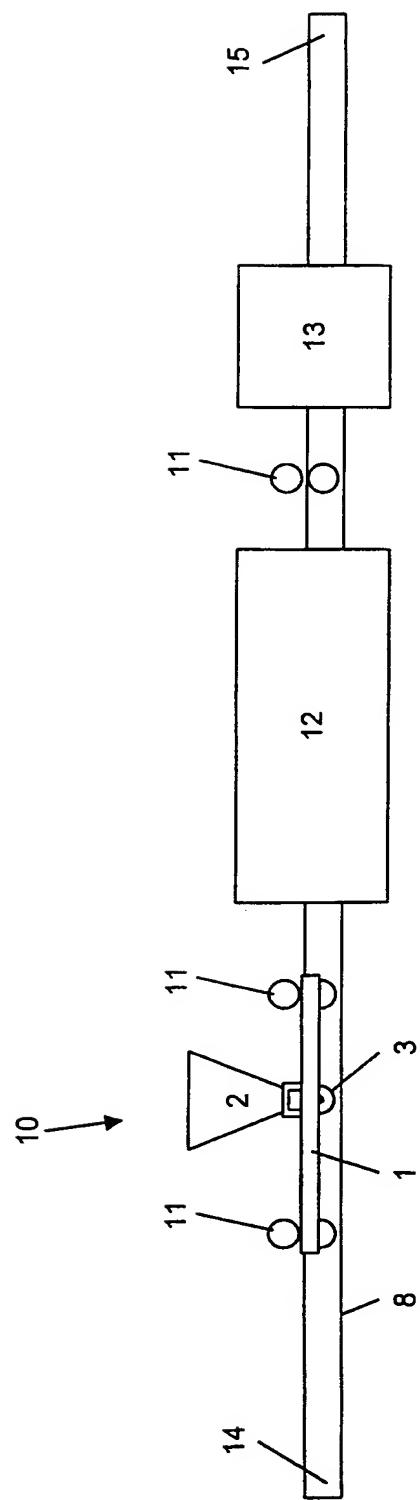


FIGURE 3